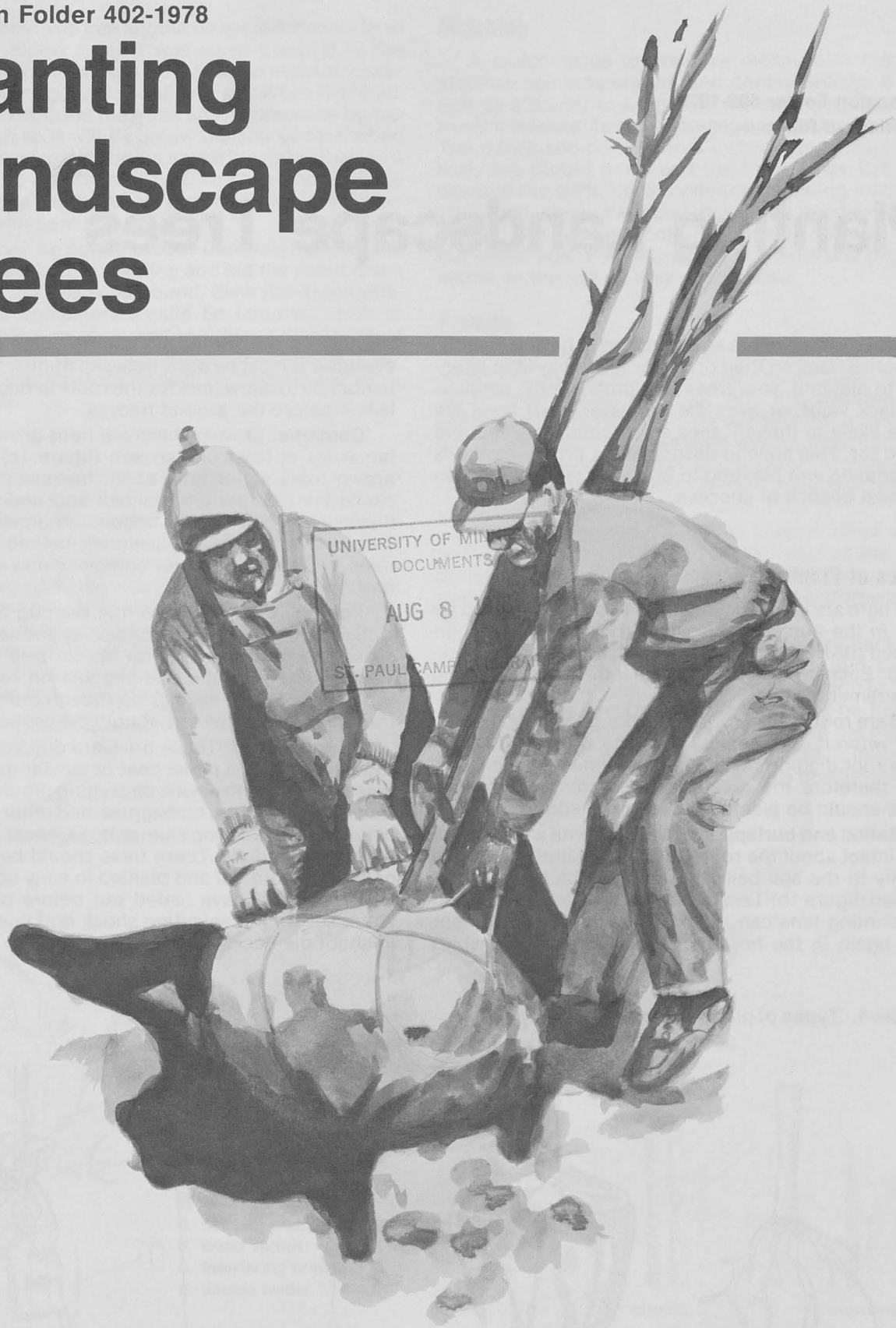
Extension Folder 402-1978

Planting Landscape Trees



Agricultural Extension Service • University of Minnesota

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By Richard Rideout

Planting Landscape Trees

Most home owners are interested in having healthy, attractive trees on their property. If you pay little attention to planting, your trees may grow slowly, continually lack vigor, or even die. However, your trees are more likely to thrive if they are properly planted and cared for. This bulletin describes the proper methods of handling and planting to give your landscape trees the best chance of success.

Types of Planting Stock

There are five basic ways that trees are prepared for sale in the nursery trade; bare root, balled and burlapped (B&B), container grown, potted, and pre-packaged. Each type has its own handling and planting requirements.

Bare root: A bare root tree is dormant and has been dug without soil remaining on the roots (figure 1a). Bare root digging results in the greatest loss of roots and therefore the greatest transplant shock. These trees should be planted only in early spring.

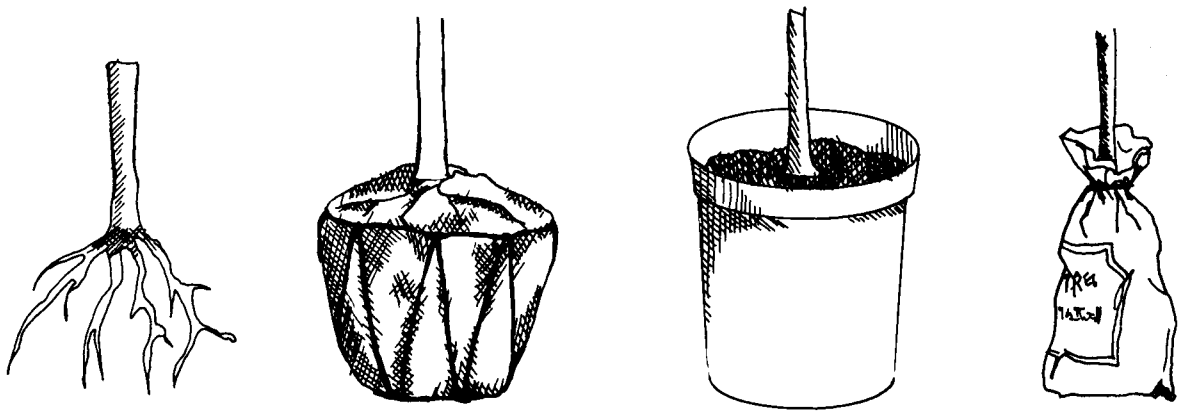
Balled and burlapped: Trees dug with a firm ball of soil intact about the roots and held by burlap secured tightly to the soil ball are known as balled and burlapped (figure 1b). Less shock results from this method so planting time can be extended into early summer and again in the fall. Because evergreens transpire throughout the winter months, fall planting of B&B evergreens must be done between August 15 and September 30 to allow time for the roots to become established before the ground freezes.

Container grown: These are trees grown in a container for at least one season (figure 1c). Container grown trees suffer little or no transplant shock because the root system is intact and undisturbed, so they may be planted throughout the growing season. This is perhaps the least desirable method of handling trees however, since the container may deform the root system.

Potted: These are trees that are dug bare root or with a soil ball and potted for display and sale the same season, or potted in fall for spring sale (figure 1c). Transplant shock and planting season requirements are much the same as for B&B, though with care potted trees may be planted throughout the growing season.

Pre-packaged: These trees are dug bare root, the roots packed with moist peat or similar material, and then wrapped with plastic packaging (figure 1d). Small fruit trees, flowering crabapples, and other species are handled this way for sale at department stores and other retail outlets. These trees should be purchased only when dormant and planted in early spring or late fall. Trees that have leafed out before planting will suffer severe transplanting shock and this may result in shoot die-back.

Figure 1. Types of planting stock



a. Bare root b. Balled and burlapped c. Potted and container grown d. Pre-packaged

Planting Location

When deciding where to plant a tree, find out the ultimate height, spread and root habit of the tree from the nurseryman. Remember that a young tree will grow both upward and outward. Avoid planting trees too close to buildings, sidewalks, or power lines where the branches may eventually interfere or where the roots may heave pavements or clog drains. Also, avoid planting trees too close to each other. To reach its full landscape potential, a tree needs plenty of room to grow, free of competition from roots and branches of other trees. A general rule is to plant trees at a distance equal to their ultimate crown spread. For example, trees that will ultimately be 40 feet wide should be spaced 40 feet apart.

Planting Hole Preparation

Soil test: The first thing to do when preparing to plant a tree is to take a soil sample and have it tested for nutrient and pH (acidity) levels. Your County Extension Director has information on soil testing. This procedure is not always necessary since most Minnesota soils have adequate nutrient levels, but it is useful to know if there are any deficiencies so you can anticipate problems. Some trees will not tolerate a high pH (alkaline) soil. Red Maple, Pin Oak, and River Birch, for example, should not be planted if the pH is much above 7.0.

Soil drainage: Tree roots require both moisture and oxygen for growth, so soil drainage should be checked before planting. A poorly drained soil, high in moisture, but low in oxygen, prevents both proper root development and growth of beneficial soil microorganisms that are responsible for decomposing organic matter and releasing plant nutrients.

To test for soil drainage, dig a hole 18 inches deep, fill it with water and let it stand overnight. If the water hasn't drained by morning there is a drainage problem. (Do not test the drainage in this manner after heavy rainfall or before the ground has thawed in the spring.)

If the soil is poorly drained, there are several alternatives. The first is not to plant a tree. A tree planted in poorly drained soil will be slow to establish, lack vigor, and often will die a slow death. It may be simpler to avoid the whole problem. The second alternative is to plant species that are tolerant of poorly drained soils, such as Willow, Silver and Red Maple, Linden, or River Birch. Artificially draining the soil is the third alternative. This can be done in two ways. If a hard pan is present (a compacted, impermeable layer of soil) with an underlying layer of well-drained soil, a hole can be dug down to the permeable layer to provide drainage for the planting hole as shown in figure 2. If the soil is poorly drained and there is no well-drained layer below, a tile system can be laid (figure 3). This, however, is expensive and requires the assistance of a professional for proper design. Simply adding gravel to the bottom of the planting hole will not provide adequate drainage and is not recommended.

Figure 2. Drainage through hard pan layer

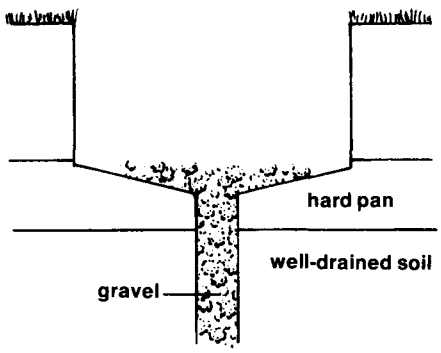
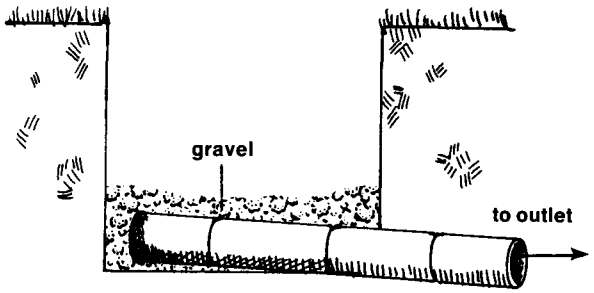


Figure 3. Drain tile system



Digging the Hole

The planting hole should be considerably larger than the root system of the tree to be planted to allow the roots to be spread out evenly and without restriction. The hole should be at least 1 foot wider and 6 inches deeper than the root system or soil ball. In poor soil situations these dimensions should be increased. The sides of the hole should be straight and the bottom flat. If you dig the hole with a soil auger, scrape and loosen the sides to allow for better root penetration into the surrounding soil.

Amending the Soil

Separate sod and poor subsoil from the good topsoil when digging the planting hole, and use only the topsoil for backfill. If the soil is fairly loamy, no additional soil amendments are necessary. Simply break up any large clods and remove stones.

If the soil is very sandy or heavy clay, the tree will do better if you replace the soil with a good loam rather than add amendments to the existing soil. In a sandy soil, the addition of 1 part peatmoss to 2 parts soil will improve the water holding capacity of the soil and may aid in establishment in a dry year. Though often recommended, adding peat to a clay soil has not been shown to improve establishment.

Generally, trees should not be fertilized at planting time because of the root damage that may result. However, if the nutrient level of the soil is low, a slow release fertilizer may be added to the planting hole or mixed in with the backfill. Slow release fertilizers only release small amounts of nutrients at any one time, so root damage is minimized.

Handling Stock Before Planting

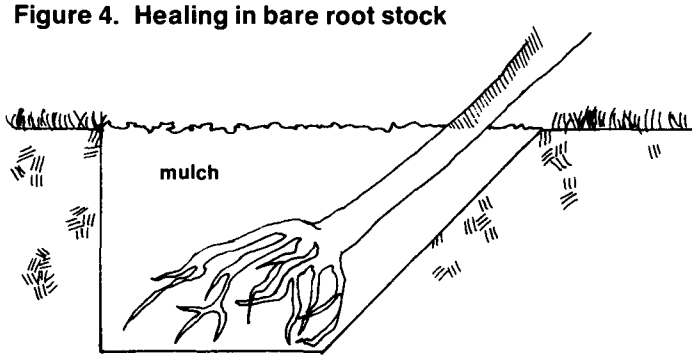
A tree is very susceptible to damage between the time it is dug and the time it is planted. Therefore, care must be taken to minimize stress in transporting and handling a tree during this period.

When transporting a tree for any distance, keep it covered or sheltered from wind and sun to prevent desiccation of the foliage, buds, or roots. B&B and container stock should always be lifted from the bottom of the ball, never the trunk, and set down carefully, not dropped, to avoid cracking or disturbing the soil ball.

Never allow the roots of a tree to dry out. This is most likely to be a problem with bare root stock since there is no soil around the roots to protect them. Keep moist peat, burlap or other such material around the roots at all times. Keep B&B and container stock moist but not soggy. Trees should be held in a cool shady place that is protected from wind and planted as soon as possible.

If planting is to be delayed more than a few days, the stock should be "healed in." Dig a trench in a shady, sheltered spot and place the bare root stock in the trench as shown in figure 4. B&B stock should be healed in upright. Cover the roots with loose soil or mulch and keep moist. Container and potted stock do not need to be healed in.

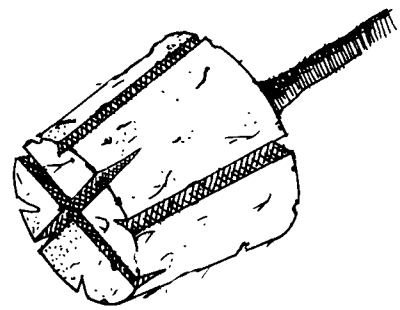
Figure 4. Healing in bare root stock



Before planting, check bare root stock for broken or damaged roots and prune off the damaged portions to facilitate healing. Potted and container stock should be removed from the container just before planting. This should be done carefully to avoid disturbing the root ball.

If trees have been grown in a container for any length of time, they may be potbound. In such cases, the roots circle around the bottom of the pot and also produce a net of roots along the sides. If nothing is done, the roots will continue to grow in this circular fashion and will eventually girdle themselves. When a tree is potbound, to prevent girdling, make a crisscross cut on the bottom about ¼ the depth of the ball and make a vertical cut on the sides just deep enough to cut the net of roots (figure 5). This will encourage the roots to grow out into the surrounding soil. Because roots are cut, some transplant shock may occur if planting is done in mid-summer.

Figure 5. Cutting potbound container stock

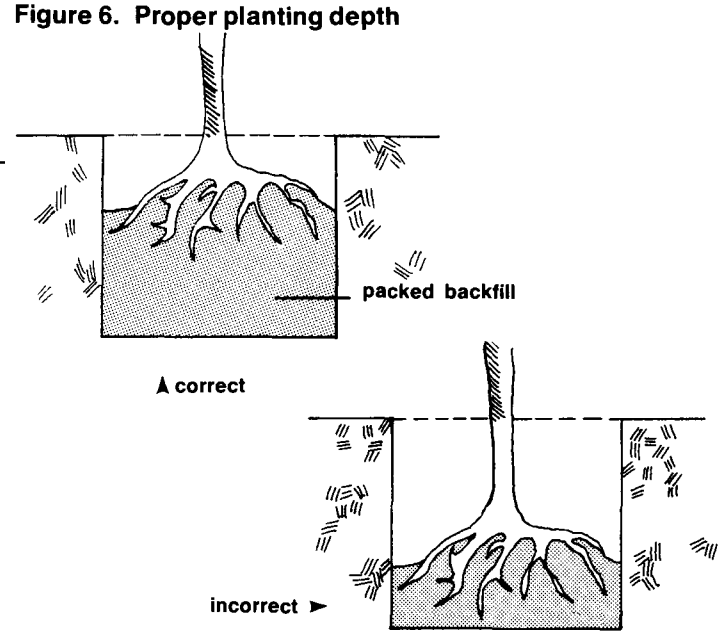


The burlap should not be removed from B&B stock. If plastic or rot-proof material was used to wrap the ball, it should be cut away after the tree has been set in the planting hole.

Planting

Bare root stock: Backfill soil into the hole so that when the tree is placed in the hole it will be growing at the same level or slightly higher than it was in the nursery (figure 6). Tamp down the soil to provide support and reduce settling. Planting the tree deeper than it was growing in the nursery may result in a stunted or dead tree.

Figure 6. Proper planting depth



Set the tree in the center of the hole with the trunk straight and the heaviest branches facing the prevailing winds. Spread out the roots so none are twisted or bent. Begin backfilling, making sure the soil filters between all the roots and no air pockets are formed. Gently raising the tree up and down as the soil is added will help. When the hole is 3/4 filled, tamp the soil gently and fill the hole with water. This eliminates any air pockets and ensures good soil-root contact. Backfill the rest of the hole but do not tamp, as the wet soil below will be compacted.

B&B stock: The tree should be set at the same level or slightly higher than it was when growing in the nursery. Pack the soil around the ball to avoid air pockets and ensure good soil-ball contact. When 3/4 filled, cut the twine around the trunk and roll back the burlap just enough so it will be below the soil surface when filled. Any burlap protruding above the soil will act as a wick and dry out the root ball. The twine around the trunk must be cut to prevent girdling of the tree. Finish filling as with bare root stock.

Container or potted stock: Carefully remove the container just before planting and cut the root system (figure 5) if the tree is potbound. Even the decomposing type of containers should be removed, both to check for girdling roots and to prevent restriction of the root system before the pot can decompose. Container and potted stock should be planted the same way as B&B.

Watering

After the tree has been planted, construct a ring of old sod or soil 3 to 4 inches high around the planting hole to facilitate watering. Water the tree thoroughly at planting time and then periodically for 2 to 3 years after. To water, fill the moat every 5 to 7 days. On sandy, well-drained soils you may have to water more often and on heavy clay soils less often. Check the soil several inches down before you water (a soil probe is useful for this purpose). If the soil is dry or just damp, water, but if the soil is already quite moist, don't water. A tree can be harmed by too much water as well as too little.

Mulching

A mulch helps to preserve moisture in the soil, stabilize soil temperature and control weeds. It also acts as a barrier to keep lawn mowers away from the trunk a leading cause of damage to landscape trees. The mulch should be 2 to 4 inches deep around the tree, but should not touch the trunk since this may damage the bark. Some common mulching materials are wood chips, chopped hay, pine needles, black plastic, and crushed rock. The organic mulches have the advantage of adding some nutrients and organic matter to the soil as they decompose.

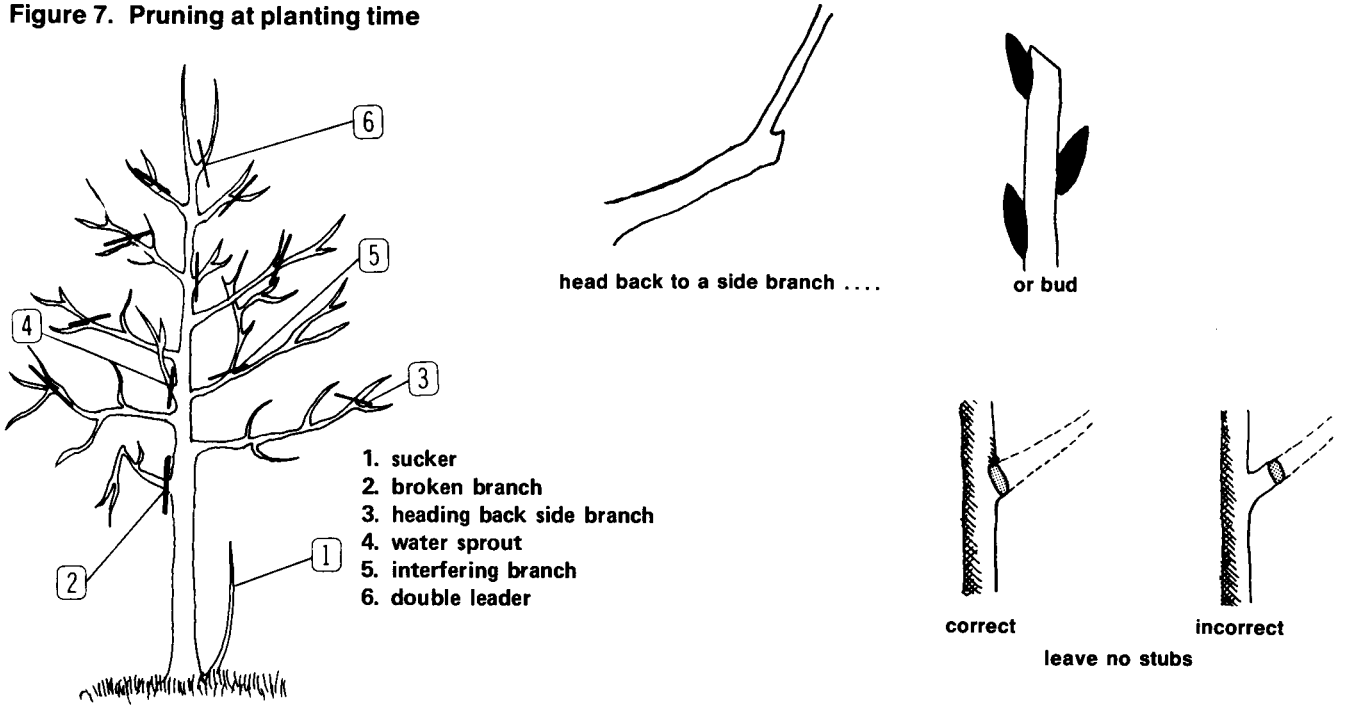
Pruning

When a tree is transplanted, many roots are lost or damaged, putting the tree under considerable stress. To compensate for this root loss, it is necessary to prune out about ⅓ of the crown. B&B trees suffer less transplant shock and so require less pruning than bare root trees. Container stock suffers very little transplant shock and needs to be pruned only to shape or remove broken branches.

The most important thing to keep in mind when pruning is to preserve the natural form of the tree. Broken branches, double leaders, water sprouts, and branches that interfere with the tree structure should be removed first.

If more pruning is needed, prune (head back) the branches either to a side branch or a bud that is pointing in the direction you wish the branch to grow (figure 7). The central leader should not be headed back unless it is considerably longer than the highest lateral branch. If you head back the leader, follow-up pruning is required to ensure that only one new leader develops.

Figure 7. Pruning at planting time



Wrapping

The trunks of newly planted trees should be kept wrapped in the winter to prevent sunscald, reduce moisture loss, and protect against animal damage. Tree wrap paper, burlap strips, or plastic trunk guards may be used. Start wrapping from the bottom, overlapping halfway on each turn to produce a shingle effect that will help shed water. Wrap up to the first major branch and secure the wrap with twine or tape, not wire. All trees should be wrapped for at least 2 years and up to 5 years for thin barked species, such as maple, mountain ash, and flowering crab. The wrap should be removed in the summer and replaced in the fall.

If rodents are a problem, place a cylinder of hardware cloth or heavy screen around the trunk. It should be several inches wider than the trunk to allow for growth. For mice, extend the screen several inches below the ground and, for rabbits, extend it 2 feet above the anticipated snow line. Plastic tree protectors are also effective.

Staking and Guying

Newly planted trees should be staked to prevent uprooting or tilting of the tree before the roots have become established. Trees less than 3 inches in caliper may be staked as shown in figure 8. The wire is strung through a section of garden hose to protect the bark from injury. The wire should be tight enough to hold the tree firmly without putting undue pressure on the trunk. Trees greater than 3 inches in caliper should be guyed as shown in figure 9. The guy wires should be tagged or marked so they are highly visible to prevent injury to pedestrians. These wires should be kept tight for a year or more until the roots become well established. This is especially true in windy areas or where there is considerable human impact. Studies have shown, however, that a staked tree develops a weaker stem than an unstaked tree so it is best to minimize staking whenever possible.

Figure 8. Properly planted bare root tree

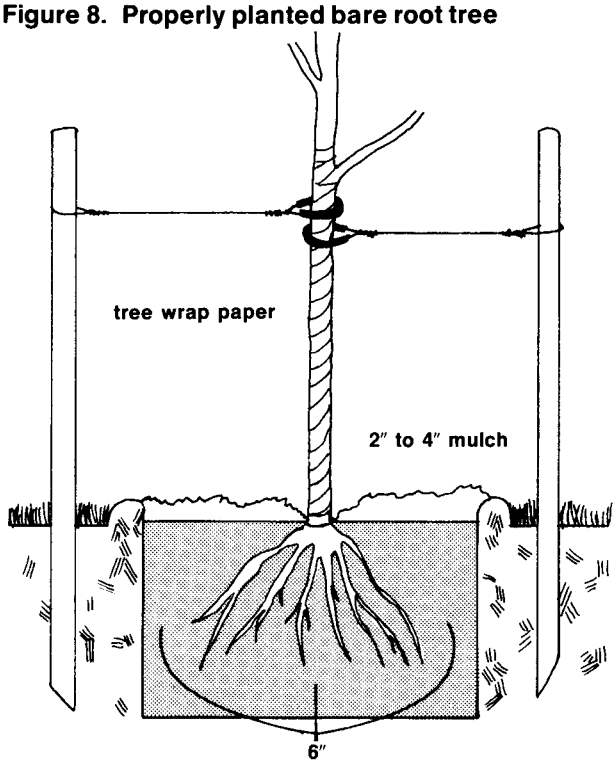
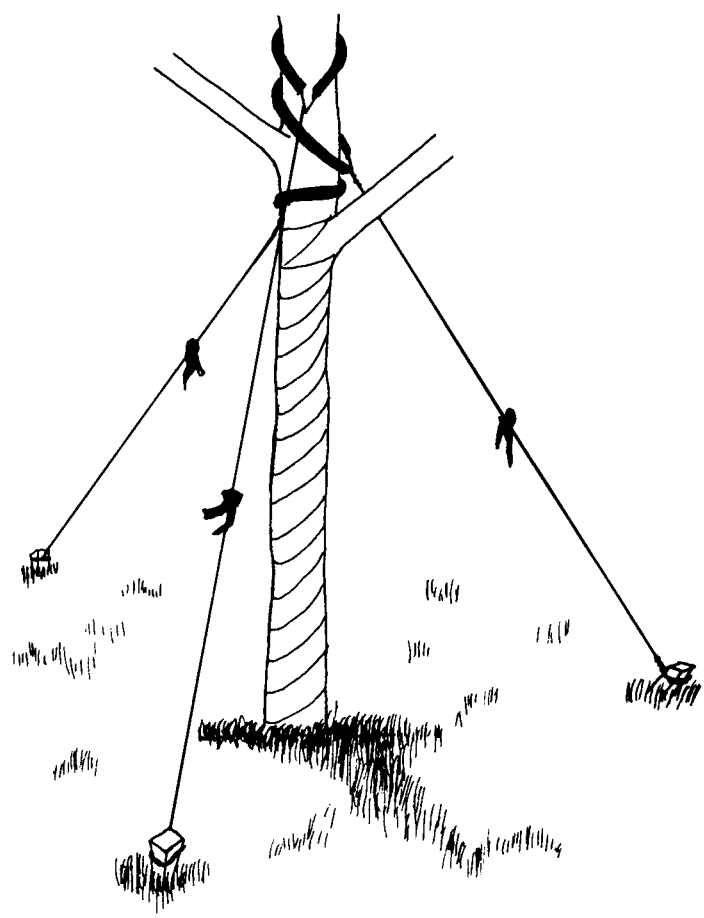


Figure 9. Guying trees greater than 3" caliper



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